

Greenhouse gas emissions from ponds: how can we get a handle on them?

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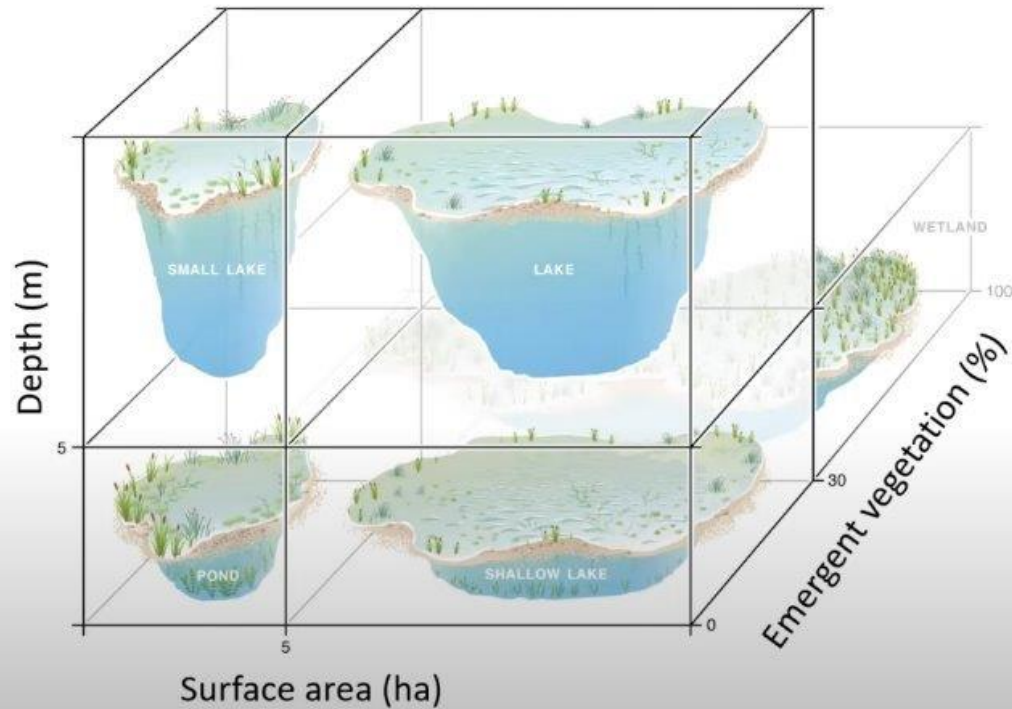
Scottish
Government
gov.scot

Hydro Nation Scholars Programme

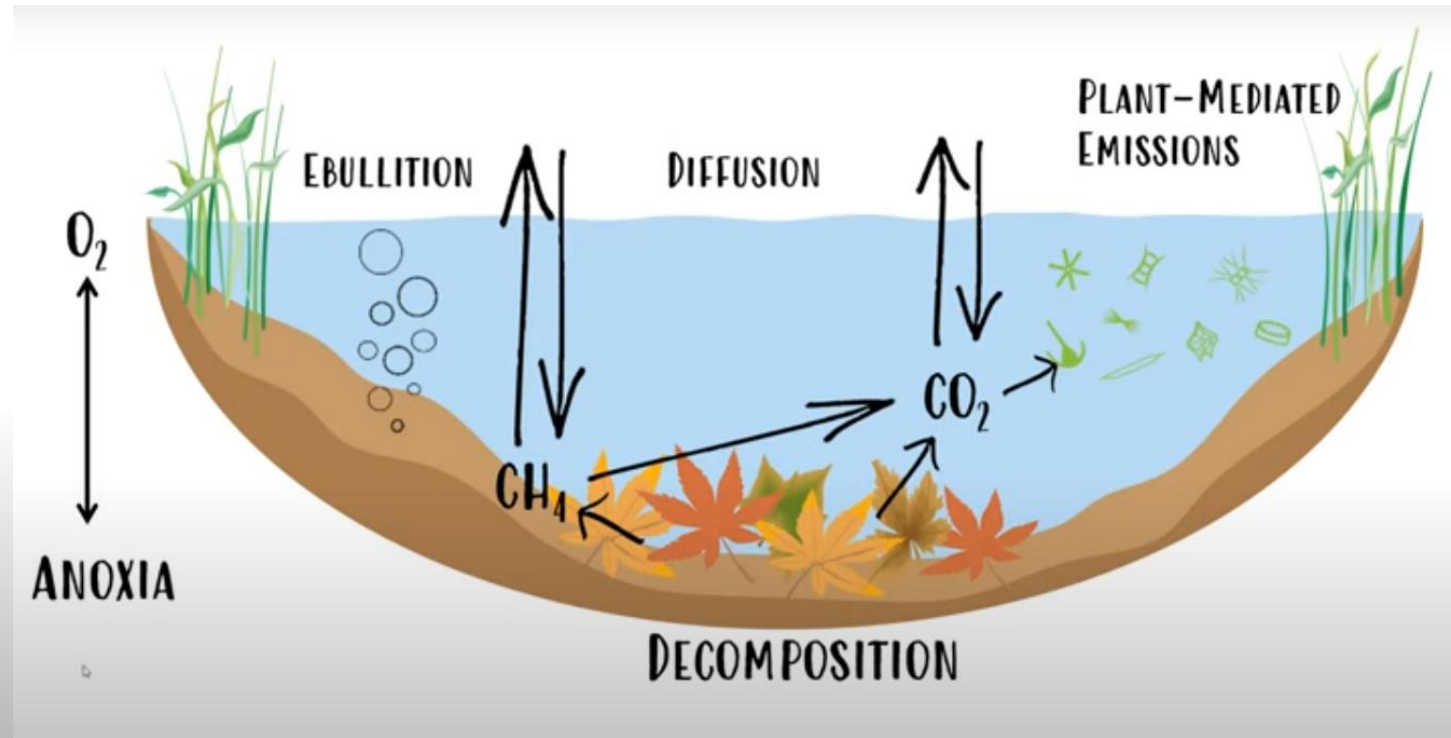


Scottish Funding Council
Comhairle Maoineachaidh na h-Alba

What are ponds?

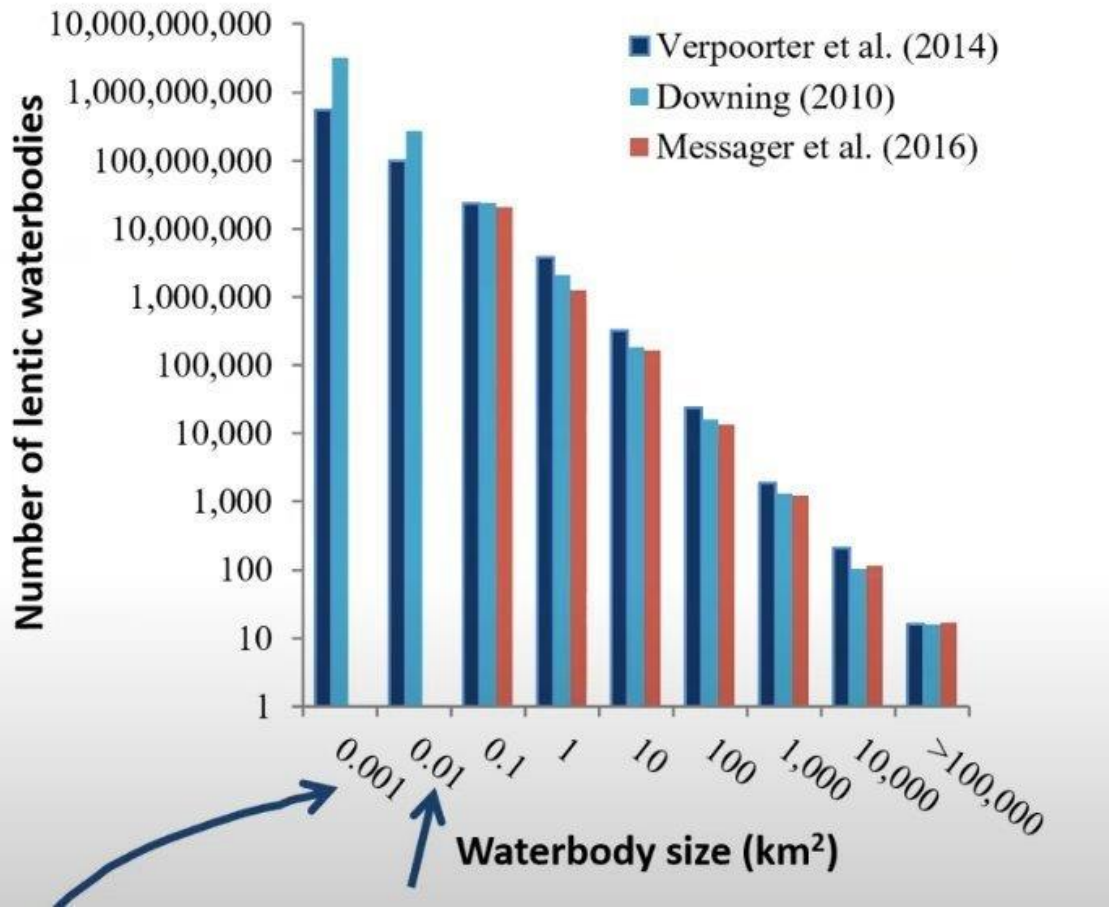


Richardson et al., 2022

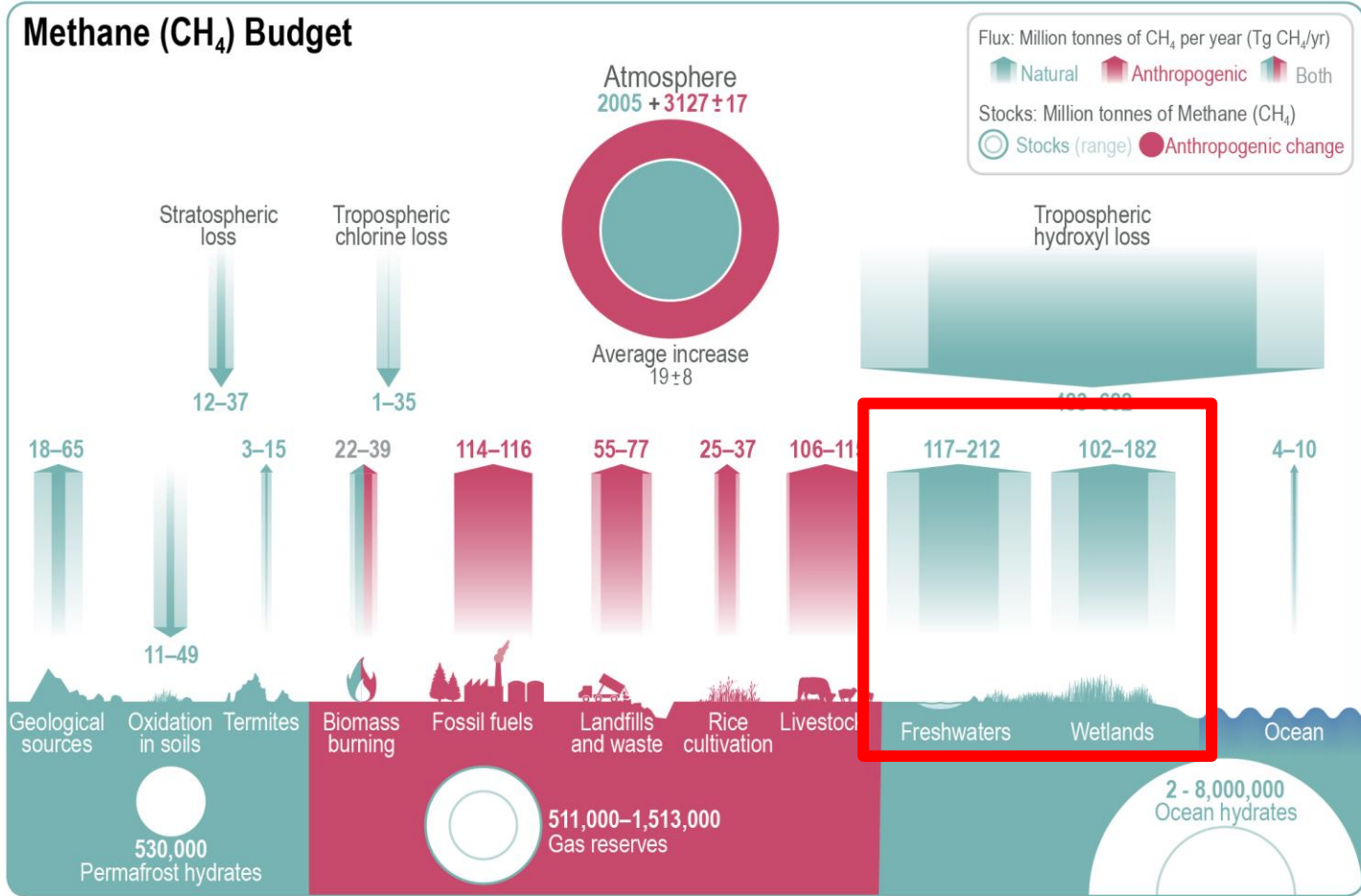


Holgerson 2024

Why ponds?



Holgerson 2024



IPPC AR6

Research questions

- How much GHG do agricultural ponds emit and does it vary seasonally?
- What are the main pond characteristics and water physiochemical parameters that can be used to predict GHG emissions?

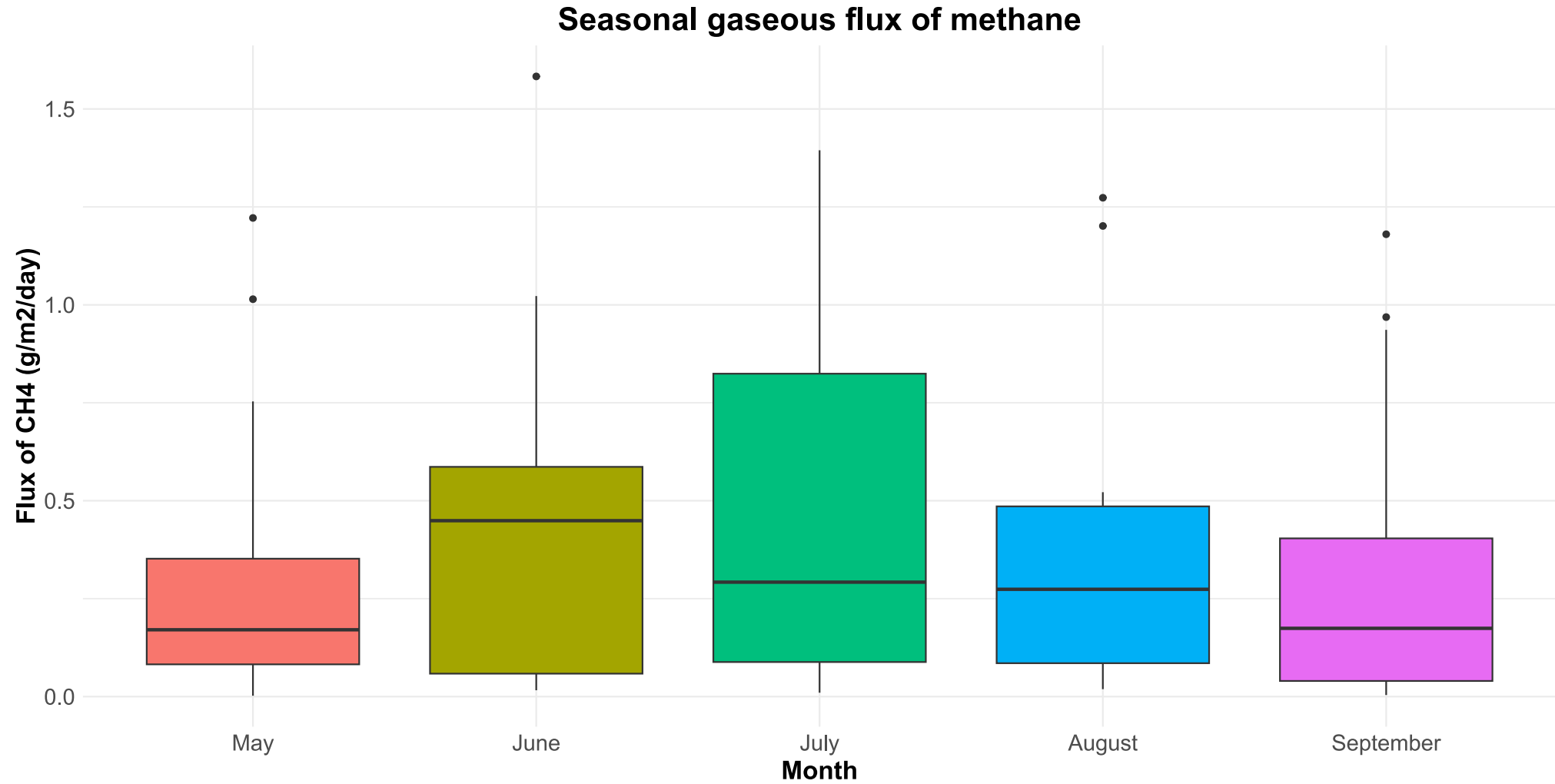




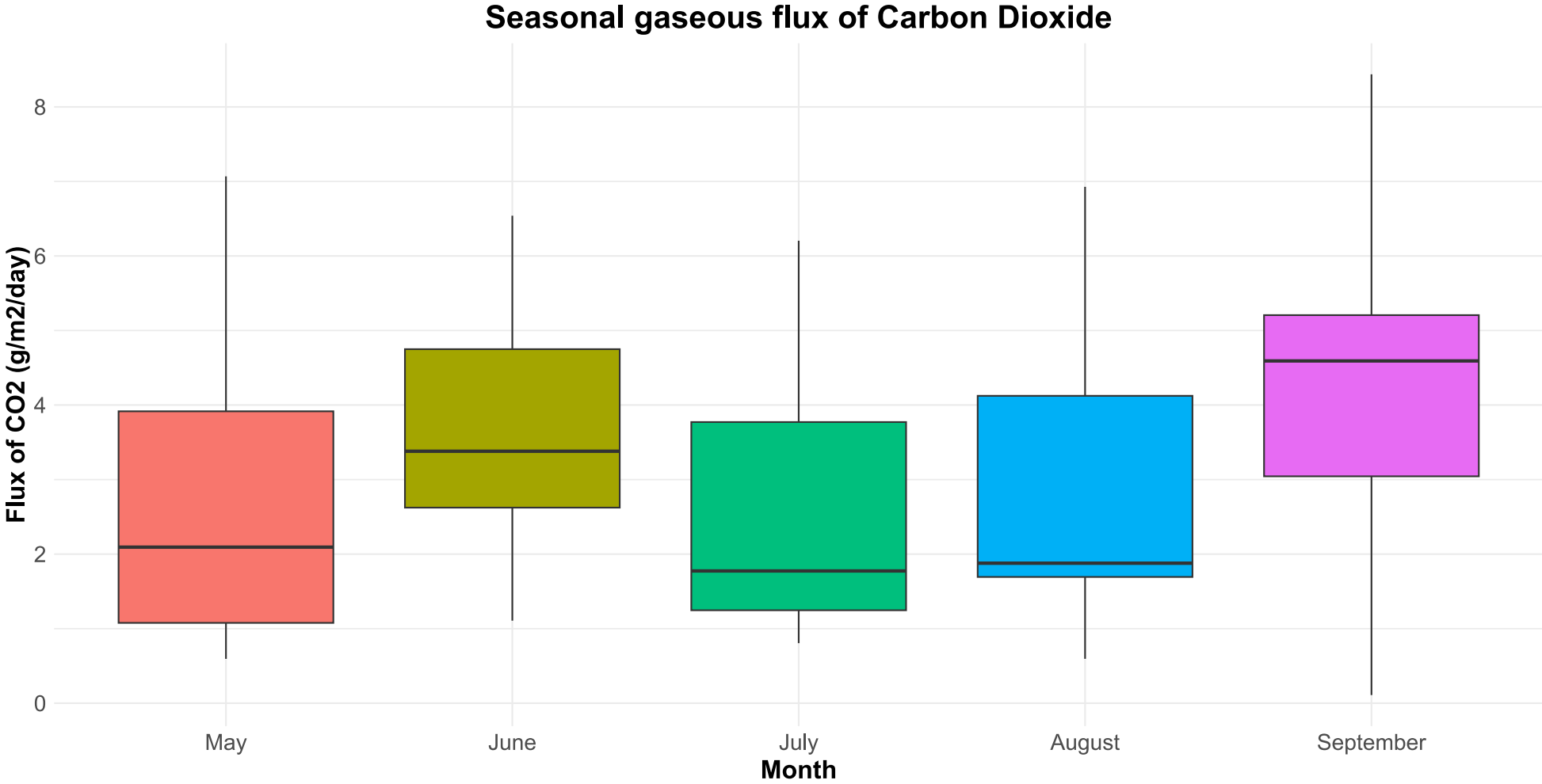
methods



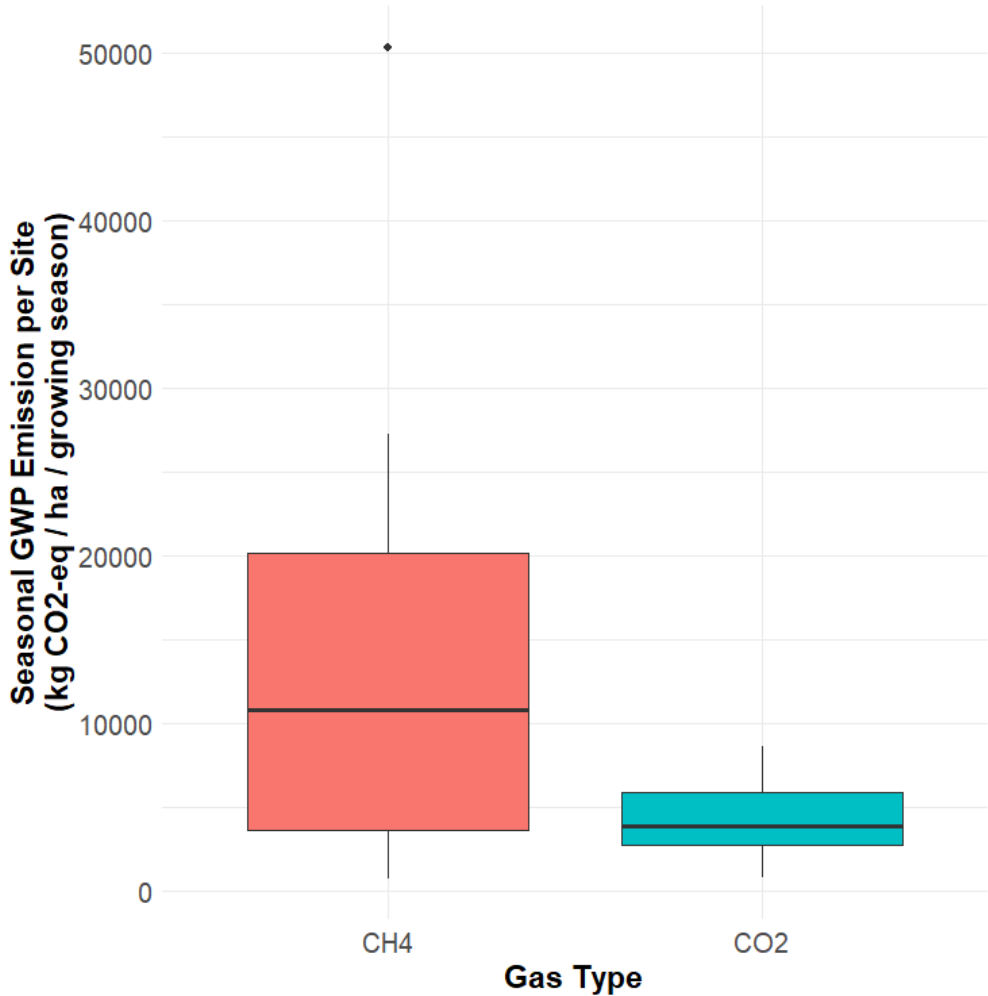
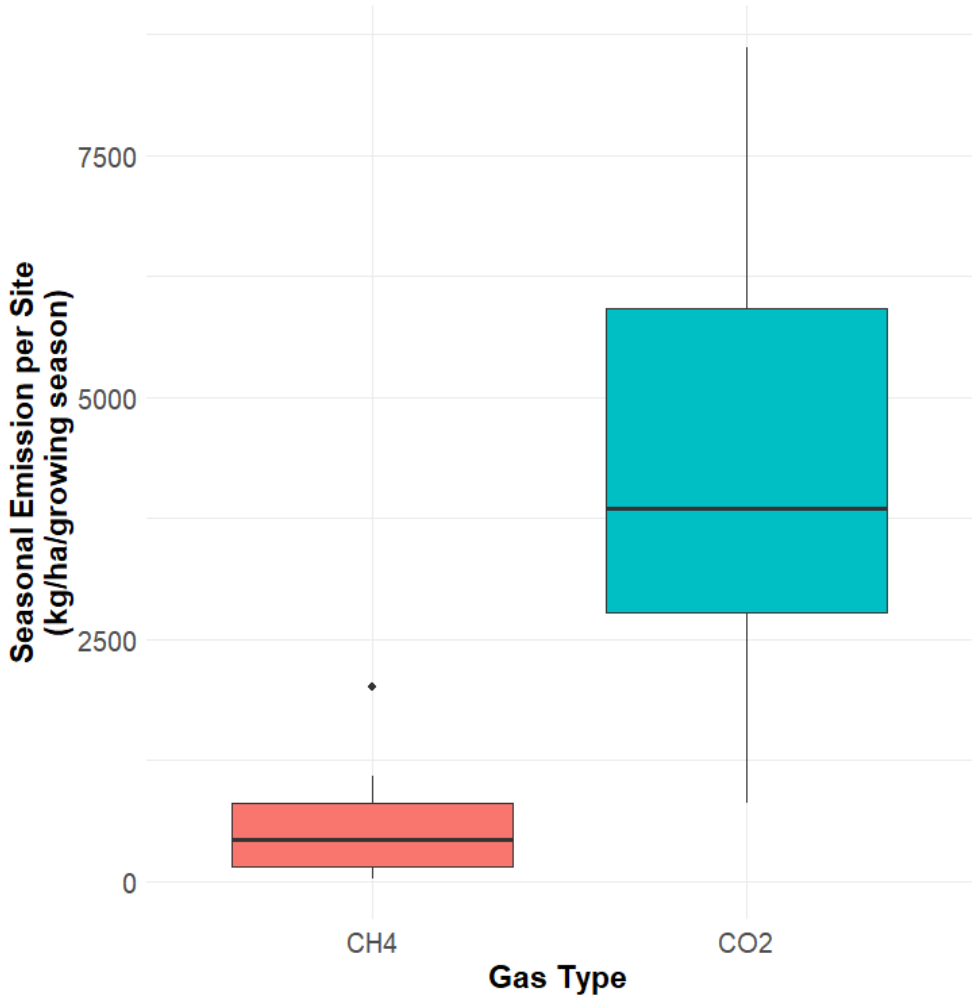
Methane (CH₄)



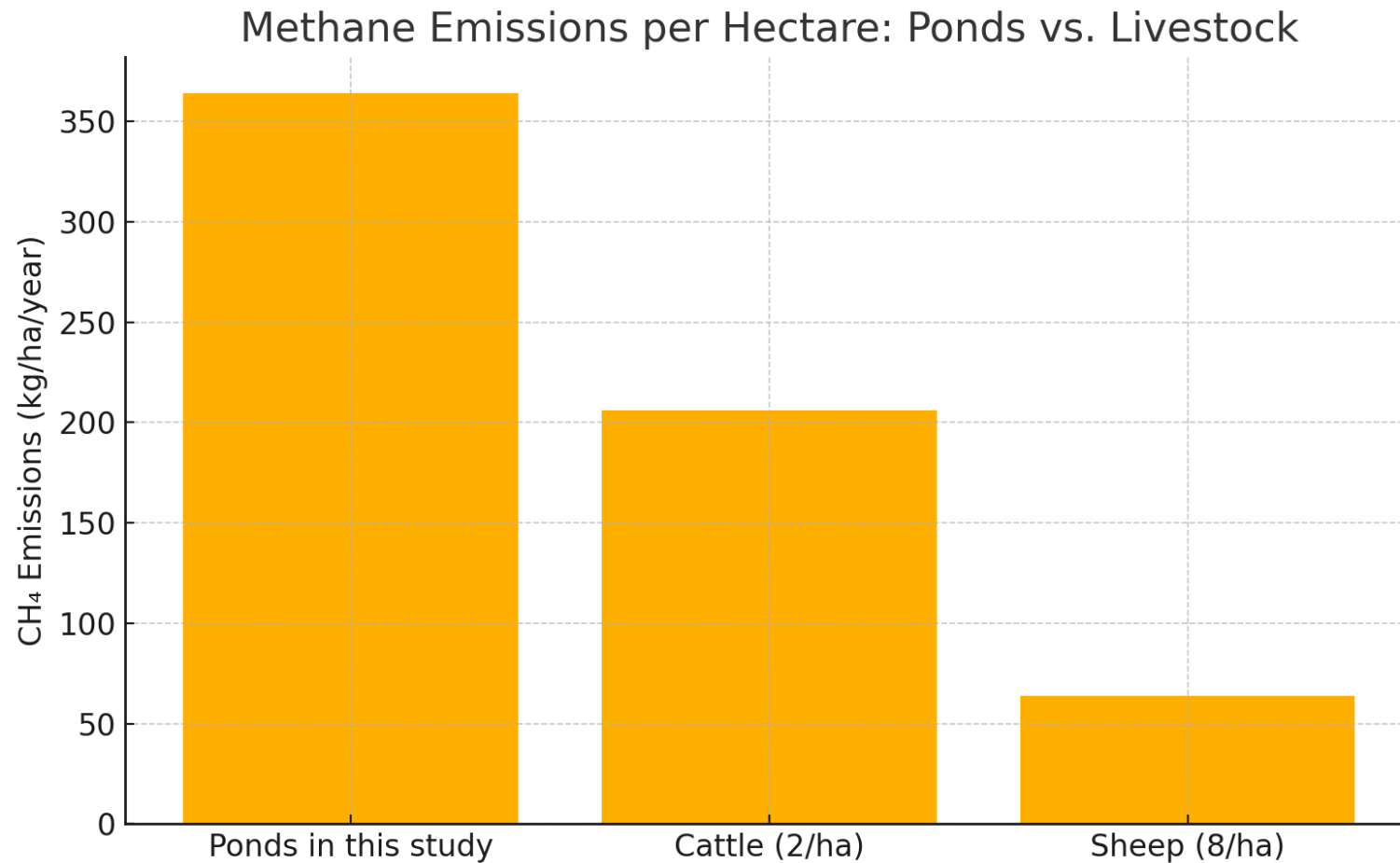
Carbon dioxide (CO₂)



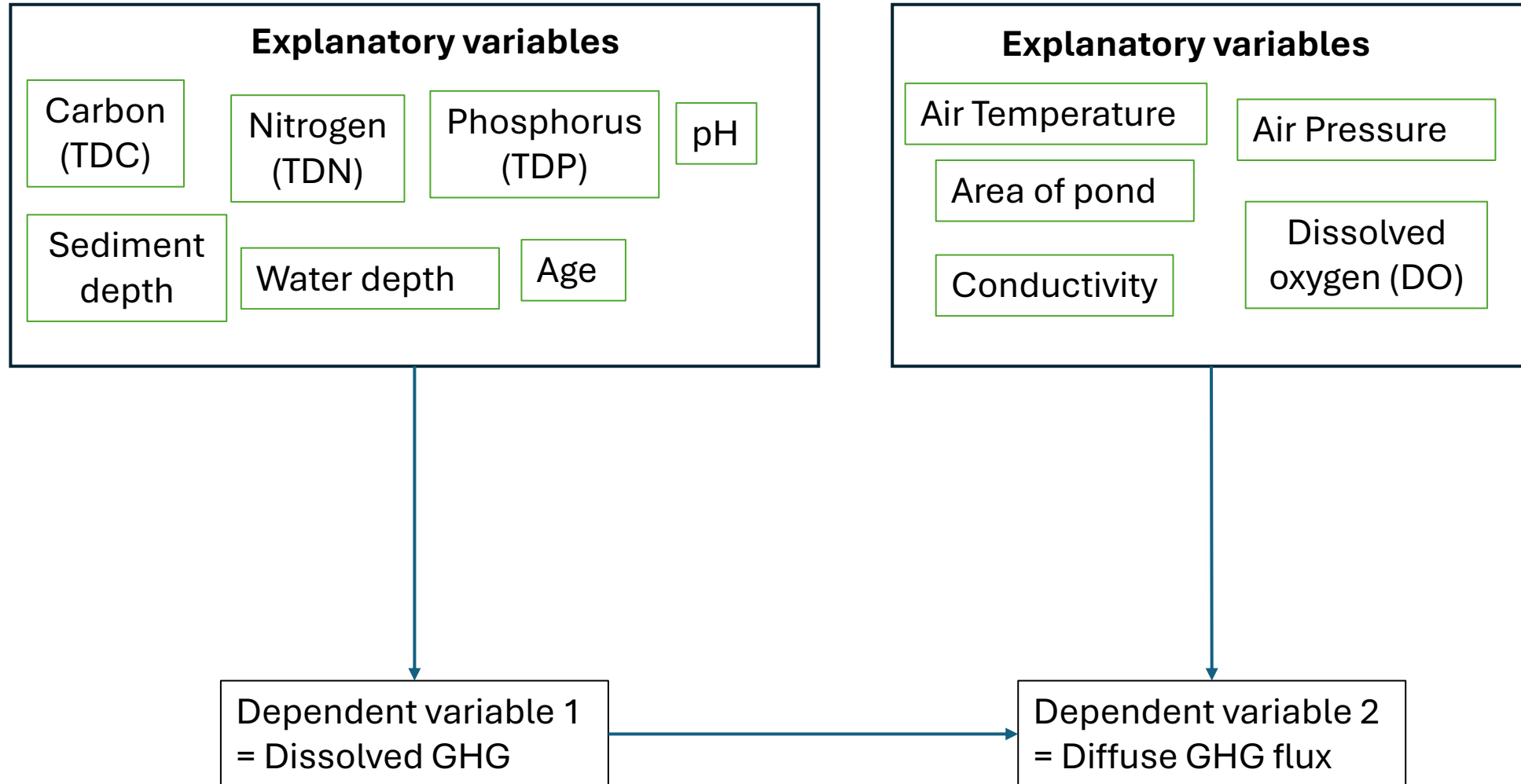
Total emissions



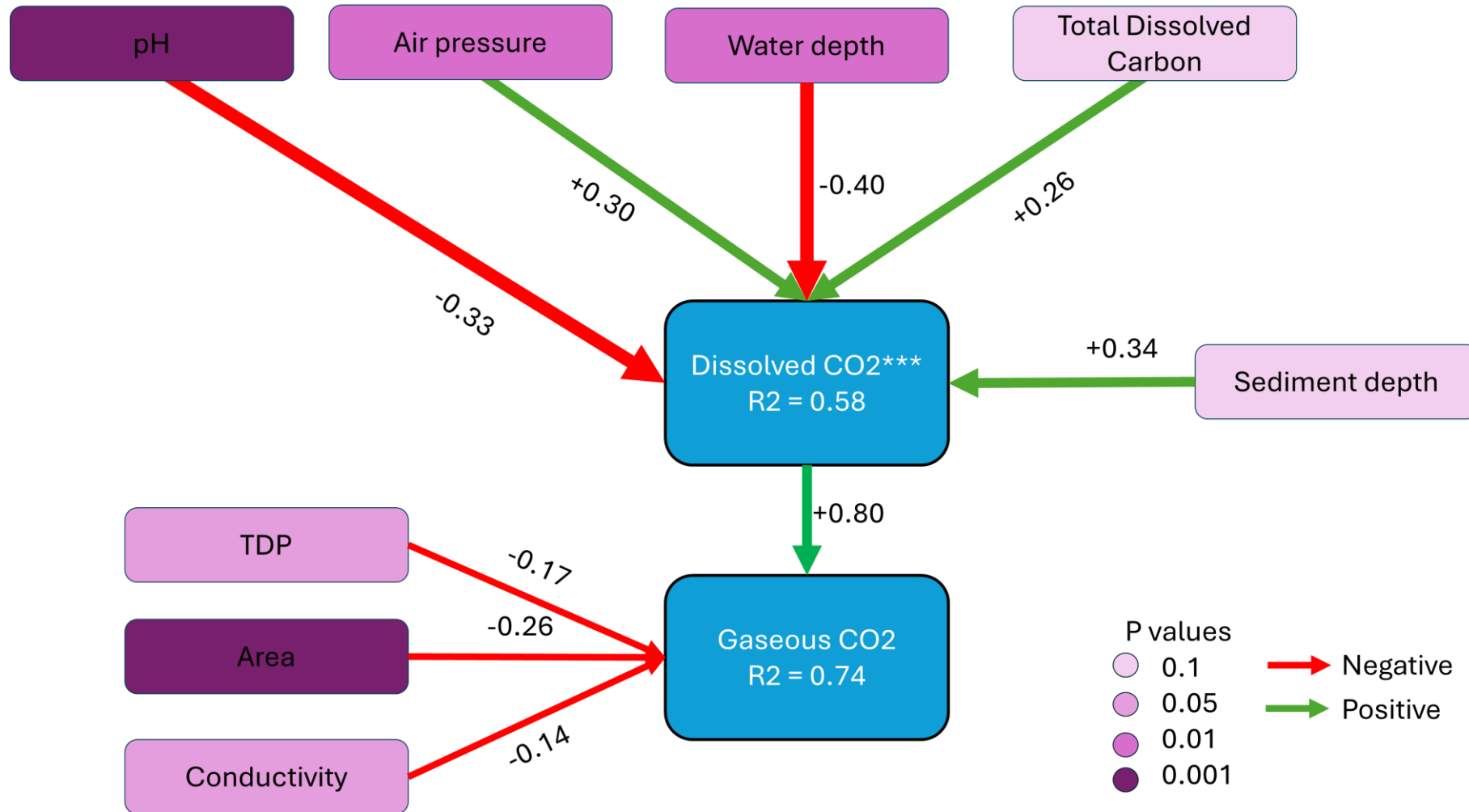
Methane comparison



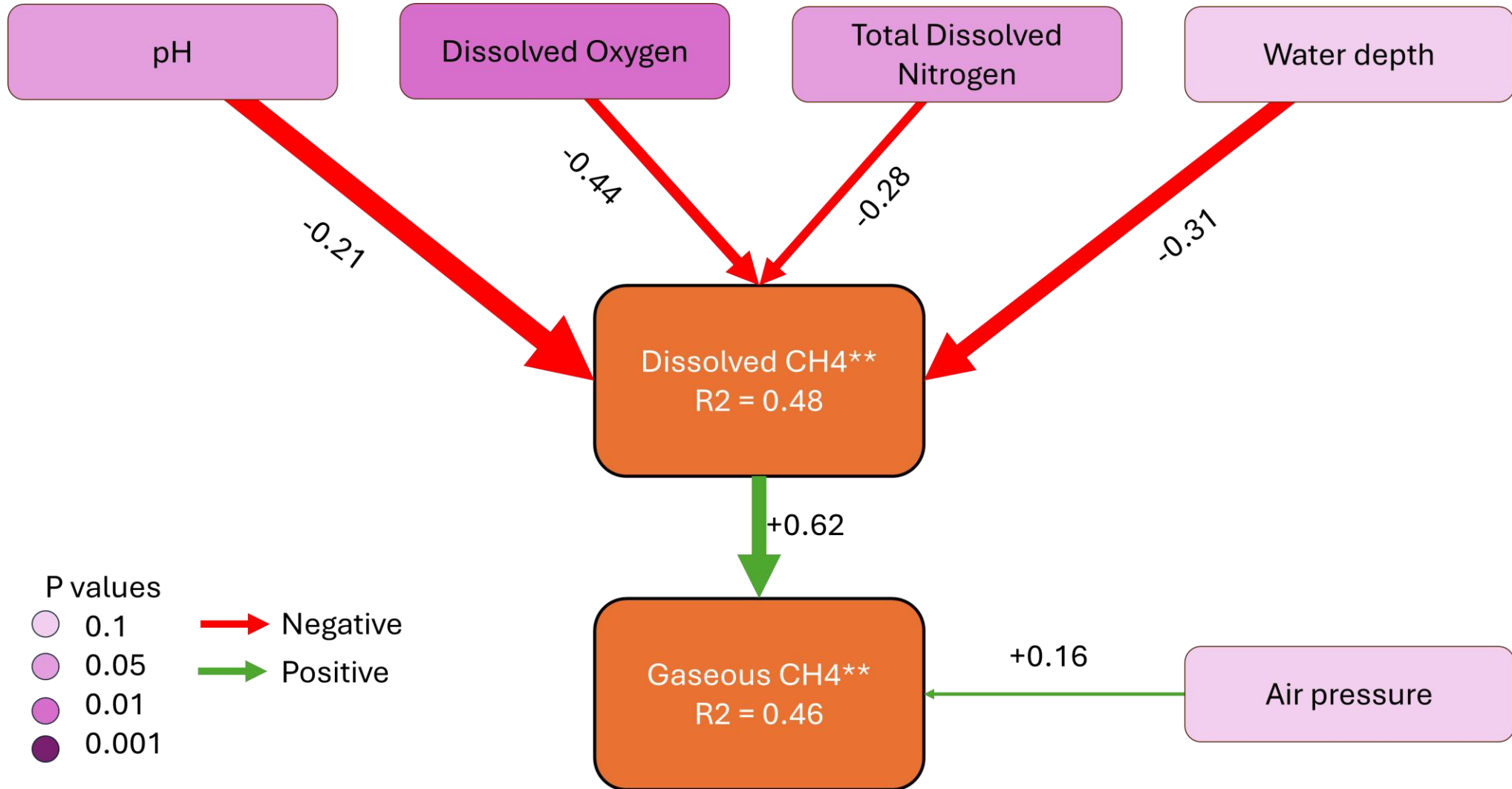
Proposed Structural equation modelling (SEM)

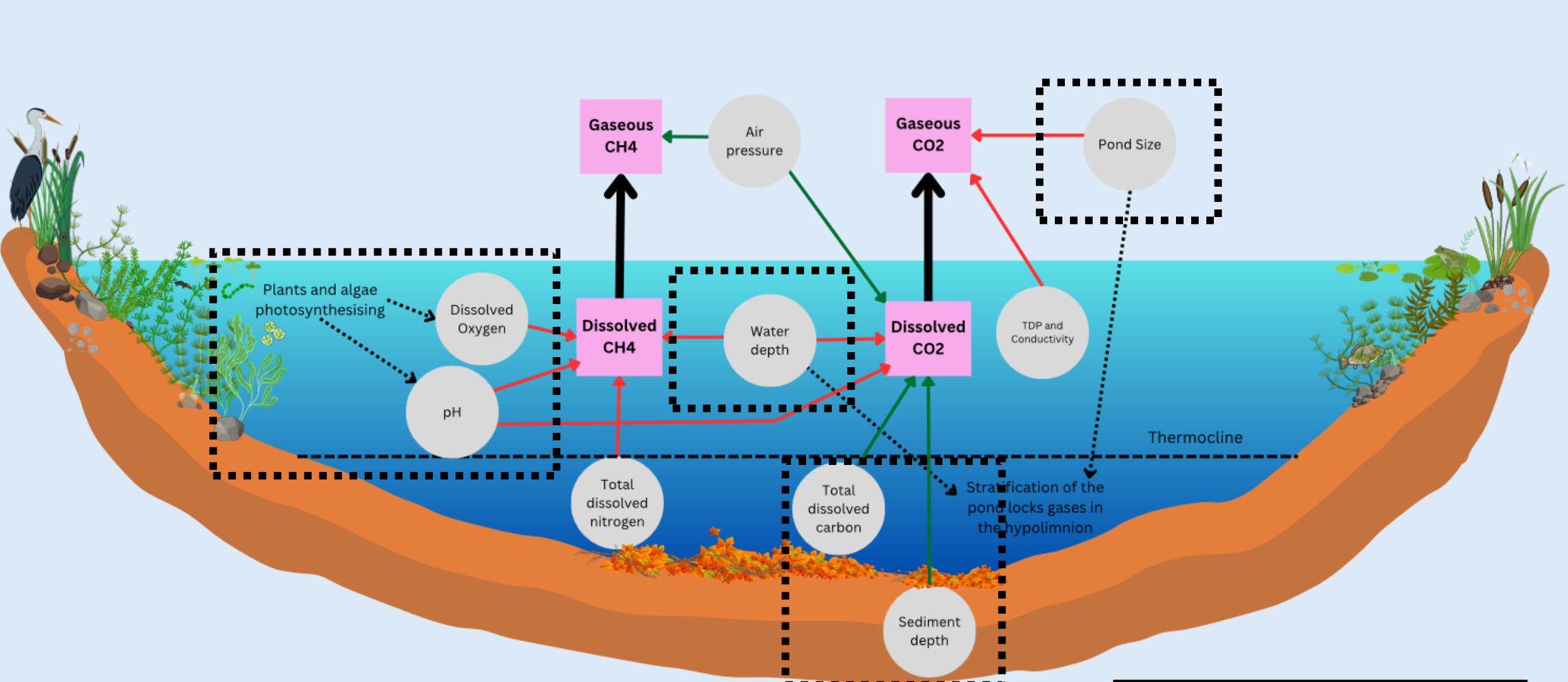


Carbon dioxide SEM

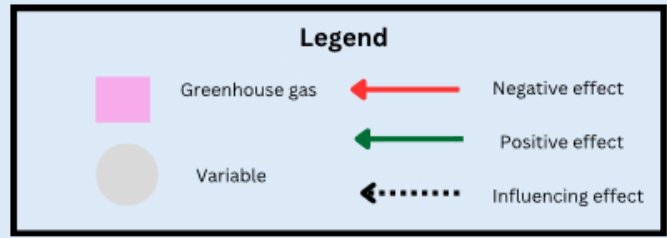


Methane SEM

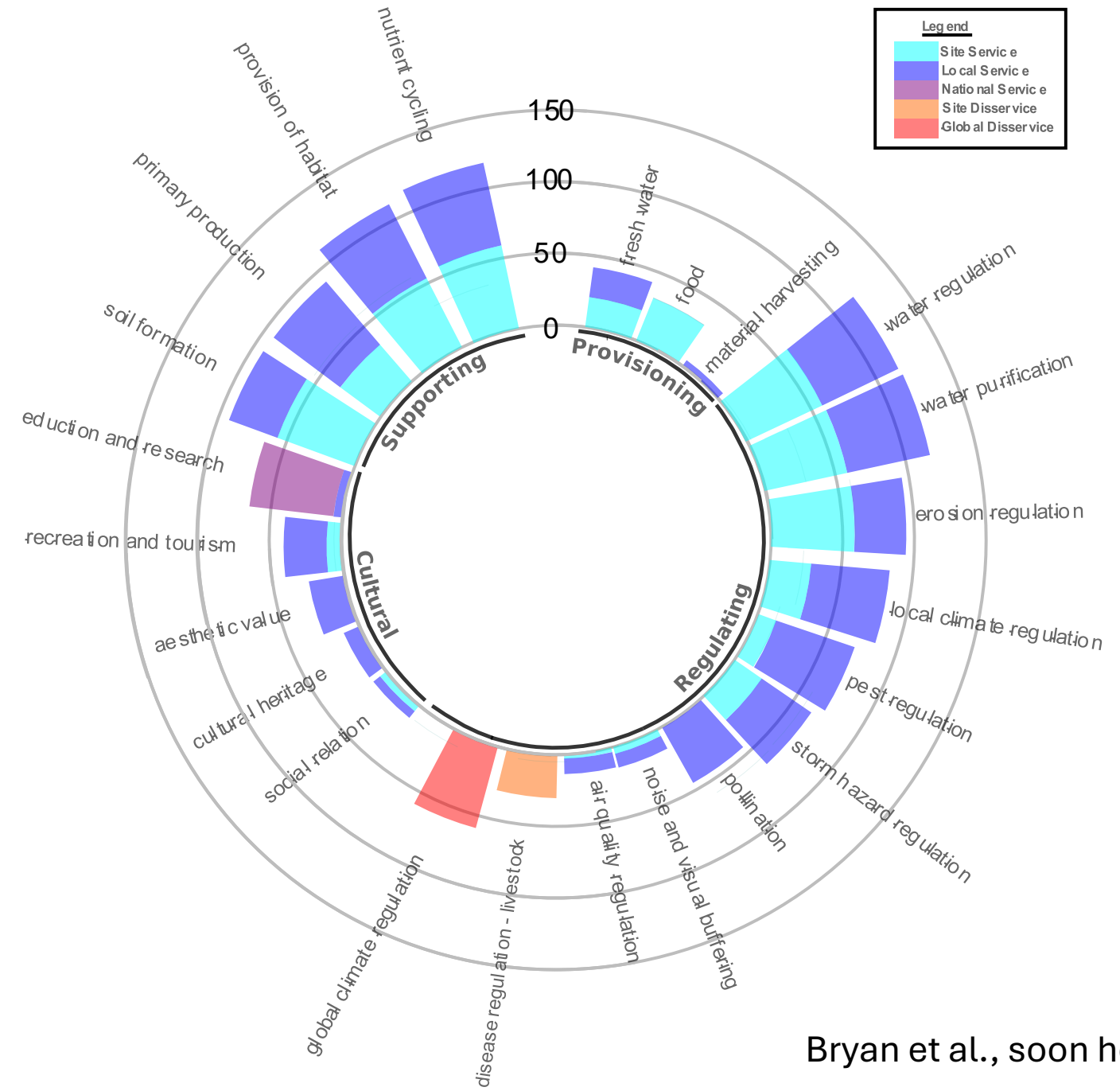




How can we manage?



It's not all about carbon!



Bryan et al., soon hopefully!

Take home messages & Questions?

- Ponds provide an overwhelmingly positive amount of ecosystem services
- But the greenhouse gas they emit is a major disservice
- The drivers of these greenhouse gas emissions are:
 - Physiochemical = DO, pH, Nutrients
 - Physical = size, water depth and stratification